**“UNIT” – LESSON PLAN**

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| Lesson 1 | Launching the Unit |
| Overview  Standard(s)  & Objectives | Overview:  This lesson consists of a series of introductory activities about magnets, including setting up a science notebook, recording prior knowledge and questions, and observing and attempting to explain a compass motor that is propelled by magnets.  Standards:  3-PS2-3 Ask questions about cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. (SEP: 1; DCI: PS2.B; CCC: Cause/Effect)  Objectives:   * Students will be able to set up a science notebook (or section of a science notebook) for this unit. * Students will be able to express their background knowledge and understandings about magnets. * Students will be able to make observations and develop initial models to explain how a compass motor works. |
| Background  Information | As children develop and refine their understanding of magnets and electricity, it is helpful for them to be able to reflect on and record what they have learned. A science notebook provides them with a record of their questions, ideas, experiences and evidence. The science notebook, along with the unit pre-test, can also be used by the teacher to assess the development of student understanding.  The anchoring event (compass motor video) is designed to provide students with a puzzling and engaging phenomenon for which they can come to a deeper understanding over the course of the unit. Do not attempt to explain this phenomenon to students. Allow them to wonder and reflect, and make sense of it as the unit unfolds. |
| Launch (15 min.) | |
| Materials | * Copies of pre-assessment * Spinning compass motor video: <https://www.youtube.com/watch?v=lGoV7vTeO6U> * Student notebooks * Chart paper and marker |
| Prior Knowledge | 1. Tell students that, in the upcoming unit, they will be learning about magnets. Explain that a pre-assessment is a way of finding out what they know and is a way of measuring how much the students have learned over the course of the unit. Let students know that there are no right or wrong answers. 2. Have students work on the pre-assessment. 3. Ask students to share some of the questions they wrote for #3. Have them suggest how they might find answers to their questions. Collect papers. |
| Goals and  Expectations | * Students complete the unit pre-assessment. * Students create a model of a spinning compass motor (this may also be used as pre-assessment data). |
| Explore (25 min.) | |
| Procedure | 1. Explain to students that you will be showing a video of a spinning compass motor that some students built. Let students know to pay attention to what makes the compass spin. 2. Play the video. 3. Ask students to turn and talk to a partner about what they see happening and why they think it happens. Replay the video if needed. 4. Make a chart to record a few observations from students about how the compass motor works. This list will serve as a reference for students as they work on their models. 5. Pass out science notebooks. Explain that scientists record their ideas, questions and models in a variety of ways. Students will use their notebooks to record their thinking throughout the unit. Demonstrate how to label and date each entry. 6. Tell students that they will be working with a partner to create a model explaining why the straw spun. They can use drawings, arrows, words, etc. to express their thinking about the compass motor and the movement of the straw. Review any classroom norms for effective partner work. 7. Students work in pairs to develop their model. They may share and discuss ideas together but should each create a model in their own notebook. As students work, circulate first to address any procedural questions and then to listen to what students are talking about and to ask probing questions (see below) to further their thinking. |
| Questions | Questions for Student Exploration:  Observation Level:   * What happens to get the straw compass moving? * What makes the straw spin? * What makes the straw spin faster or slower?   Unobservable (or less observable) Level:   * How do you think magnetic force plays into the spinning compass? * The compass never touches the electromagnet, so what makes the compass move? * The student is turning a switch on and off. What do you think that has to do with making the compass move?   “What If” Scenarios   * What if you changed the length of the straw? * What if the electromagnet were moved farther from the compass? * What if the student turned the switch on and off faster/slower? * What if the student held the switch down? * What if the magnets at the ends of the straw were bigger? * What if you used two batteries? * What if you wanted to change the direction of the spin?   Teacher Tips:  As you listen in on student talk and examine students’ work on developing their models, look for partial understanding about big science concepts such as magnetic force (attraction/repulsion), magnetic field, polarity and electricity.  Extension:  Students can share their models with other pairs and discuss similarities and differences among the models. |
| Summarize (10 min.) | |
| Communicate | Have select pairs of students share their models for the spinning compass motor.  Explain to students that they will be doing a series of investigations to test their ideas and to gather evidence about magnetism and motors.  Record a list of hypotheses students have identified as being important. The list should be revised as students gather evidence. |
| Terminology and Concepts to Solidify | At this point in the unit, students may or may not use any scientific terminology; let them explain their ideas using their own words. Later in the unit, connections can be made between more specific science terms and student language. |
| Connection  to Big Ideas (Phenomena) |  |
| Follow Up/Practice | Students can freely explore the properties of magnets and various objects to see what magnets can do. |
| Assessment | The unit pre-assessment and the science notebooks will become part of a portfolio of student work containing drawings, ideas, discoveries and questions. In most cases, they will show gradual progress in the achievement of both content and practice standards. |